

A NOTE ON THE MORPHOLOGICAL CHARACTERISTICS OF THE  
ALIMENTARY CANAL IN *LIBYTHEA CELTIS* (LEPIDOPTERA :  
RHOPALOCERA), UNDER THE COMPARISON WITH THAT  
OF THE HESPERIIDAE

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Family Libytheidae is a very small family in Japan, included only one species, *Libythea celtis*, although this family is remarkable for its wide geographical distribution. Generally speaking, the Libytheidae are closely related to the Nymphalidae in external structure, and also resemble some of the Hesperiidae in habit. Moreover, this family is very similar to the Pieridae in the shape of larvae, and somewhat resemble the Lycaenidae in the form of prothoracic legs. Recently, EHRLICH (1958) and MAEKI (1961) reported that the Libytheidae associated with the Nymphalidae rather than the remainder of the butterflies. However, at present, our knowledges concerning with the phylogeny of this family are still very scanty. Therefore, a detailed morphological analysis of *L. celtis* is very significant for understanding the phylogenetic relationship between the Libytheidae and the other families of the butterflies.

The present author has been engaging in a comparative analysis of the alimentary canal in butterflies with a hope to contribute something to the phylogenetic significance and evolution of species. In the previous paper (HOMMA 1954), the author described comparative anatomy of the alimentary canal in 57 species of butterflies collected in Japan, with the exception of the Libytheidae. So far as the author's knowledge is concerned, no report has yet been published on the morphological characters of the alimentary canal in *L. celtis*. The present paper deals with a morphological analysis of the alimentary canal in *L. celtis*, compared with that of the Hesperiidae.

Before going further, the author must express his cordial thanks to Dr. TOHRU UCHIDA, Emeritus Professor of Hokkaidô University, for his kind guidance and encouragement.

**Material and method:** The specimens of *Libythea celtis* used for the present study were 10 males and 3 females in total. They were collected by the author himself in Tôkyô. The entire bodies were fixed *in toto*, without any dissection, and preserved in 75% alcohol. Dissections and observations were made under the binocular microscope at magnification of 20 times.

The alimentary canal of *L. celtis* was observed in the following parts: mesenteron, anterior intestine, rectum and Malpighian tubules. Further, the special attention was focused on the structural differences of the mesenteron between the Libytheidae and the Hesperiidae, since the mesenteron is one of the most remarkable characteristics for discussing the relationship of the butterflies, as mentioned by the present author previously (1954). The structures of the alimentary canal of the Hesperiidae and the other butterflies were mostly referred to the results of the previous observation reported by the present author (1954), in which 7 species of the Hesperiidae were examined. In the present study, the alimentary canal of *Pelopidas mathias* (Fam. Hesperiidae)

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was additionally observed in 5 males.

**Result:** In *Libythea celtis*, the mesenteron is a flat and straight tube, having many circular folds on the surface. The folds are bordered with narrow grooves. The anterior part of the mesenteron is slightly wider than the posterior part. The cardia is concealed. The anterior intestine is about twice as long as the mesenteron. The rectal caecum, without papillae, is moderately developed. Each Malpighian tubule is divided into three branches successively at two points of a distance. An example of the typical shapes of the mesenteron and rectum is shown in Figure 1.

The mesenteron of the Hesperiidae is rather flat and elongate tube, of which surface with many circular folds. Generally, the tube of this family slightly winds up as seen in *Pelopidas mathias* (Fig. 2), while in certain species such as *Potanthus flavum* (Fig. 3) it is of straight form. The folds on the surface of the mesenteron are bordered with narrow grooves. The anterior part of the mesenteron is slightly wider than the posterior part. The cardia is concealed. The anterior intestine is about 2-3 times as long as the mesenteron. The rectal caecum, without papillae, is moderately developed (Figs. 2 and 3). Each Malpighian tubule is divided into three branches successively at two points of a distance.

In most of the Nymphalidae, the mesenteron shows a slightly flat and elongate form, widens gradually towards the apical end, and is provided with many circular folds on the surface. It is notable that in most species of this family each fold is constricted into many processes. The cardia is concealed. The anterior intestine is about 1.5-3 times as long as the mesenteron. The rectal caecum is moderately or exceedingly developed, without papillae, while in some species it is reduced. Each Malpighian tubule is divided into three branches successively at two points of a distance. However, in some species, it is divided into three branches at a common point (see HOMMA, 1954).

As regards the external characters of the alimentary canal, *L. celtis* is closely related to the Hesperiidae rather than the remainder of the butterflies, particularly to certain species of the Hesperiidae, such as *Pelopidas mathias* and *Potanthus flavum*. On the other hand, the structure of the alimentary canal of *L. celtis* apparently differs from that of the Nymphalidae. These evidences may contradict to the results of EHRLICH (1958) and MAEKI (1961).

Family Hesperiidae is considered, in a broadened sense, to be of the most primitive or ancestral group among the butterflies. Similar evidence has been indicated in the study of the alimentary canal in 57 species of butterflies by the present author (1954).

With respect to the external characters of the alimentary canal, *L. celtis* may be classified to be of a comparatively primitive butterfly as well as the Hesperiidae.

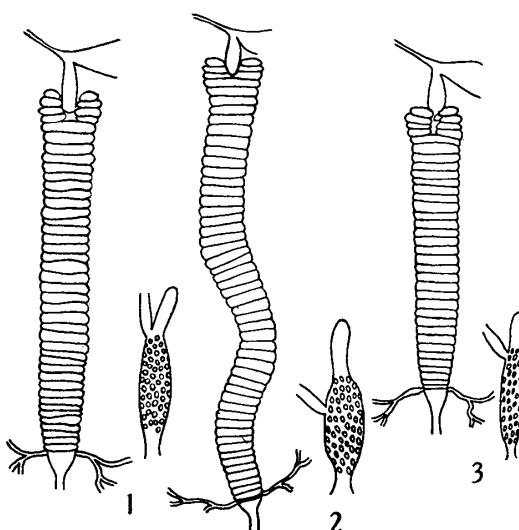


Fig. 1 *Libythea celtis*

Fig. 2 *Pelopidas mathias*

Fig. 3 *Potanthus flavum*

## Summary

1. A morphological study of the alimentary canal in *Libythea celtis* was carried out in the present paper.
2. In the various components of the alimentary canal, special attention was paid to the structural differences of the masenteron between the Libytheidae and the Hesperiidae.
3. With respect to the external characters of the alimentary canal, (a) *L. celtis* is closely related to some of the Hesperiidae, and apparently differs from the Nymphalidae. (b) Thus, *L. celtis* is considered to be of a primitive butterfly as well as the Hesperiidae.

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## 摘要

著者は、蝶の消化管の比較解剖を行なっているが、テングチョウ (*Libythea celtis*) の消化管の形態、特に中腸(胃)の形態について注目すべき特徴をもっていることが分かったので報告する。

一般に、消化管の外部形態についてみると、テングチョウはセセリチョウ科の蝶と似ているが、タテハチョウ科の蝶とは明らかに違った特徴をもっている。そして、テングチョウは、セセリチョウ科の蝶と同様に“未分化の（原始的な）蝶”であると考えられる。